

## VENTILATION PIPE PLUG

### CROSS REFERENCE TO RELATED APPLICATION

This application is a continuation-in-part application claiming the benefit of U.S. Patent Application Serial No. 10/105,665, filed March 14, 2002, incorporated herein by reference.

### FIELD OF INVENTION

**[001]** This invention relates to ventilation pipes that extend above roofs of buildings from plumbing and various spaces in the buildings and, more particularly, to a ventilation pipe protector in the form of a plug for insertion into the pipe to guard against intrusion by insects/rodents and debris.

### BACKGROUND OF INVENTION

**[002]** Numerous ventilating covers and caps for ventilating pipes above roofs of buildings are known, but not with the effectiveness, convenience of installation and convenience of removal, if desired, taught by this invention.

**[003]** Examples of most-closely related known but different devices are described in the following patent documents:

<u>U.S. Patent No.</u>	<u>Inventor</u>	<u>Issue Date</u>
5,291,707	McDonald	03-08-1994
421,098	Harrington	02-11-1890
1,868,730	Dowrie	07-26-1932
6,244,006	Shue, <i>et al.</i>	06-12-2001
5,081,914	Mejia	01-21-1992
4,026,688	Patterson	05-31-1977

4,399,743	Izzi, Sr.	08-23-1983
5,341,767	Smith	08-30-1994

[001] All patents listed herein are incorporated herein by reference in their entirety.

## SUMMARY OF THE INVENTION

[004] Objects of patentable novelty and utility taught by this invention are to provide a ventilation-pipe plug which:

- prevents debris, bugs, rodents, snakes, frogs, roaches and other objectionable items from entry into ventilation pipes;
- is quick and easy to install;
- can be removed easily for maintenance if desired; and
- is long lasting without corrosion, and can be made to fit all sizes of ventilation pipes.

[005] In one embodiment, this invention accomplishes these and other objectives with a ventilation-pipe cap having a cap sleeve with an internal periphery having a pipe fastener which fastens predeterminedly to an external periphery of a ventilation pipe and has a plurality of cap-ventilation orifices sized and arranged to prevent entry of debris and life forms predeterminedly without diminishing gas-flow ventilation capacity of the ventilation pipe.

[006] In another embodiment of this invention, a ventilation pipe plug includes a tubular sleeve having a sleeve outside diameter smaller than a ventilation pipe inside diameter. The sleeve includes an inlet end for receiving a gas and a hollow head attached to an end of the sleeve opposite the inlet end to allow the gas to flow from the sleeve into the head. The head includes a head outside diameter larger than the sleeve outside diameter. The head also includes a plurality of passageways sized to allow egress of the gas from the head and to prevent ingress of animals and debris into the head.

[007] The above and other objects, features and advantages of the present invention should become even more readily apparent to those skilled in the art upon a reading of the following detailed description in conjunction with the drawings wherein there is shown and described illustrative embodiments of the invention.

### BRIEF DESCRIPTION OF DRAWINGS

[008] This invention is described by appended claims in relation to description of preferred embodiments with reference to the following drawings which are explained briefly as follows:

[009] FIG. 1 is a partially cutaway side elevation view of a ventilation-pipe cap having a domed apex on a cap sleeve with parallel cylindrical walls that fit predeterminedly onto an external periphery of the ventilation pipe which is shown extended from a ventilation-pipe base on a roof;

[0010] FIG. 2 is a partially cutaway side elevation view of the ventilation-pipe cap shown in FIG. 1, but with a cap sleeve that includes a pipe-receptacle section with a step wall for receiving the ventilation pipe within the inside periphery of the pipe-receptacle section and for resting the ventilation-pipe cap on the step wall;

[0011] FIG. 3 is a partially cutaway side elevation view of the ventilation-pipe cap shown in HG. 1, but with slightly tapered cylindrical walls for a push-on fit of the internal periphery of the cap sleeve onto the external periphery of the ventilation pipe;

[0012] FIG. 4 is the FIG. 3 illustration, but with addition of an apex-riser section intermediate the cap apex and a cap fastener that includes the slightly tapered cylindrical walls of the cap sleeve for inclusion of horizontal ventilation orifices;

[0013] FIG. 5 is a partially cutaway side elevation view of the ventilation-pipe cap having the domed cap apex and having a cap fastener that includes the cap sleeve with straight-threaded, tapered cylindrical walls screwed onto straight threads of a fastener sleeve that is adhered to the ventilation pipe;

[0014] FIG. 6 is the FIG. 5 illustration, but with addition of the apex-riser section 15

intermediate the cap apex and having the cap fastener that includes the cap sleeve with straight-threaded, tapered cylindrical walls screwed onto straight threads of a fastener sleeve that is adhered to the ventilation pipe;

[0015] FIG. 7 is a partially cutaway side elevation view of the ventilation-pipe cap having a perch-prevention point and having the slightly tapered cylindrical walls for a push-on fit of the internal periphery of the cap sleeve onto the external periphery of the ventilation pipe;

[0016] FIG. 8 is the FIG. 7 illustration, but with addition of an apex-riser section intermediate the cap apex and a cap fastener that includes the slightly tapered cylindrical walls of the cap sleeve for inclusion of horizontal ventilation orifices;

[0017] FIG. 9 is a partially cutaway side elevation view of the ventilation-pipe cap having the perch-prevention point and having the cap fastener that includes the cap sleeve with straight-threaded tapered cylindrical walls screwed onto straight threads of the fastener sleeve that is adhered to the ventilation pipe;

[0018] FIG. 10 is the FIG. 9 illustration, but with addition of the apex-riser section intermediate the perch-prevention point and having the cap fastener that includes the cap sleeve with the straight-threaded tapered cylindrical walls screwed onto the straight threads of the fastener sleeve that is adhered to the ventilation pipe;

[0019] FIG. 11 is a partially cutaway fragmentary view of the cap fastener that includes the fastener sleeve with tapered threads onto which matching tapered threads of the cap sleeve are screwed and the fastener sleeve is adhered to the ventilation pipe;

[0020] FIG. 12 is a partially cutaway fragmentary view of the cap fastener that includes the fastener sleeve having a quick-disconnect pin extended horizontally into a circumferential channel in the cap sleeve and the fastener sleeve is adhered to the ventilation pipe;

[0021] FIG. 13 is the FIG. 12 illustration with the cap sleeve rotated ninety degrees to show the quick-disconnect pin in a lock bay from a front view; and

[0022] FIG. 14 is a section view of the FIG. 13 illustration through a section line 13-13 of FIG.13.

[0023] Fig. 15 is a side elevation view of a ventilation pipe.

[0024] FIG. 16 is a partially cutaway side elevation view of a ventilation-pipe plug of an alternate embodiment of the present invention.

[0025] FIG. 17 is a partially cutaway side elevation view of a ventilation-pipe plug of an alternate embodiment of the present invention installed in a ventilation pipe.

[0026] FIG. 18 is a plan view of a collar extension for use with the ventilation pipe plug of the present invention.

[0027] FIG. 19 is a partially cutaway side elevation view of a ventilation-pipe plug of an alternate embodiment of the present invention installed in a ventilation pipe with the collar extension.

[0028] Throughout the figures, the same reference numerals and characters, unless otherwise stated, are used to denote like features, elements, components or portions of the illustrated embodiment. Moreover, while the subject invention will now be described in detail with reference to the figures, it is done so in connection with a preferred embodiment. It is intended that changes and modifications can be made to the described embodiment without departing from the true scope and spirit of the subject invention as defined by the appended claims.

#### DESCRIPTION OF PREFERRED EMBODIMENT

[0029] Listed numerically below with reference to the drawings are terms used to describe features of this invention. These terms and numbers assigned to them designate the same features throughout this description.

1. Cap sleeve	13. Ventilation-pipe threading
2. Ventilation pipe	14. Fastener-sleeve threading
2a. Ventilation pipe top opening	15. Quick-disconnect pin
3. Cap apex	16. Circumferential channel
4. Ventilation orifices	17. Linear inlet
5. Ventilation-pipe base	18. Lock bay
6. Roof	19. Arcuate dome
7. Pipe-receptacle section	20. Perch-prevention point

8. Step wall	21. Ventilation pipe plug
9. Fastening taper	22. Plug head
10. Apex-riser section	23. Plug sleeve
11. Cap-fastener section	24. Plug neck
12. Fastener sleeve	25. Ventilation orifices
	26. Collar

[0030] Referring to **FIG. 1**, a ventilation-pipe cap has a cap sleeve 1 with an internal periphery that is circumferential and includes a cap fastener for fastening the cap sleeve 1 to a ventilation pipe 2 predeterminedly. The ventilation-pipe cap includes a cap apex 3 predeterminedly above and proximate an axis of the cap sleeve 1. A plurality of ventilation orifices 4 are arranged predeterminedly intermediate the cap fastener and the cap apex 3.

[0031] The ventilation pipe 2 extends from a ventilation-pipe base 5 that is sealed onto a roof 6 above plumbing and various building features that are ventilated with the ventilation pipe 2. The ventilation orifices 4 are sized and arranged predeterminedly intermediate the cap fastener and the cap apex 3 to prevent entry of predetermined debris and life forms into the ventilation pipe 2.

[0032] The cap fastener can include a circumferential internal periphery of the cap sleeve 1 that fits predeterminedly snug on an external periphery of the ventilation pipe 2 as shown in **FIG. 1**.

[0033] Referring to **FIG. 2**, the cap sleeve 1 can include a pipe-receptacle section 7 with a step wall 8 for receiving the ventilation pipe within the inside periphery of the pipe-receptacle section 7 and for resting the step wall 8 and, therefore, resting the ventilation-pipe cap on a top perimeter of the ventilation pipe 2. The pipe-receptacle section 7 and the step wall 8 are a cap fastener that can be gravity operable. Optionally, fit of the pipe-receptacle section 7 on the outside periphery of the ventilation pipe 2 can have a relatively low tolerance for inexpensive manufacture and can be adhered with an adherent.

[0034] Referring to **FIGS. 3-4**, the cap fastener can include a circumferential internal periphery of the cap sleeve 1 that has a predeterminedly fastening taper 9 outward radially from the axis of the cap sleeve 1 for a push-on fit of the internal periphery of the cap sleeve 1 onto the

external periphery of the ventilation pipe 2. The fastening taper 9 outward radially is preferably one-half-to-one degree. This is less expensive to machine for a suitable fit than for machining the internal periphery of the FIG. 1 cap sleeve 1 to fit snugly onto the outside periphery of the ventilation pipe 2. This fastening taper 9 is so slight that it is not easily detectable in the drawing where it is shown in FIGS. 3-4 at the inside periphery of the cap sleeve 1. It is an additional inexpensive option to the pipe-receptacle section 7 and the step wall 8 of the FIG. 2 illustration.

[0035] As depicted in FIGS. 4, 6, 8 and 10, the cap sleeve 1 can include an apex-riser section 10 intermediate the cap apex 3 and a cap-fastener section 11 of the cap sleeve 1. The apex-riser section 10 includes the ventilation orifices 4 in fluid communication intermediate an outside periphery and an inside periphery of, the apex-riser section 10.

[0036] Referring to FIGS. 1-14, an adherent that can be a sealant and that can include lead can be applied between the internal periphery of the cap sleeve 1 and the outside periphery of the ventilation pipe 2.

[0037] Referring further to FIGS. 5-6 and 9-11, the cap fastener can include a fastener sleeve 12 having a circumferential inside periphery that fits predeterminedly onto the external periphery of the ventilation pipe 2. The fastener sleeve 12 includes an external periphery having ventilation-pipe threading 13 and the internal periphery of the cap sleeve 1 includes fastener-sleeve threading 14 that matches the ventilation-pipe threading 13. The ventilation-pipe threading 13 and the fastener sleeve threading 14 can be tapered threading or what is known as pipe threading as depicted in FIG. 11. Optionally, the ventilation-pipe threading 13 and the fastener-sleeve threading 14 can be un-tapered, parallel threading or what is known as straight threading as depicted in FIGS. 5-6, and 9-10.

[0038] Optionally, the fastener sleeve 12 can have an internal periphery with either a fit on the outside periphery of the ventilation pipe 2 as shown and described in relation to FIG. 1, a fastening taper 9 as shown and described in relation to FIGS. 5-6 and 9, or a pipe-receptacle section 7 with a step wall 8 as shown and described in relation to FIGS. 2, 10 and 12-13. An adherent is optional for either.

[0039] Referring to FIGS. 12-14, the cap fastener can include a quick-disconnect pin 15 that is extended radially from the fastener sleeve 12 into a circumferential channel 16 having a linear inlet 17 to receive the quick-disconnect pin 15. The linear inlet 17 terminates in the

circumferential channel 16 that extends circumferentially for a partial rotation intermediate the linear inlet 17 and a lock bay 18 which receives the quick-disconnect pin 15 in a locked mode. To prevent weight of the ventilation-pipe cap from resting on the quick-disconnect pin 15 in the locked mode, the fastener sleeve 12 can be made to support the cap sleeve 1 with the step wall 8 in the cap sleeve 1 as described in relation to **FIG. 2** for the ventilation pipe 2 to support the weight of the ventilation-pipe cap.

[0040] Referring further to **FIGS. 1-6**, the cap apex 3 can be domed upwardly with an arcuate dome 19 predeterminedly proximate the axis of the cap sleeve 1. The arcuate dome 19 can include the ventilation orifices 4 in fluid communication intermediate an outside periphery and an inside periphery of the arcuate dome 19.

[0041] Referring further to **FIGS. 7-10**, the cap apex 3 can be pointed upwardly with a perch-prevention point 20 predeterminedly proximate the axis of the cap sleeve 1. The perch-prevention point 20 includes the ventilation orifices 4 in fluid communication intermediate an outside periphery and an inside periphery of the perch-prevention point 20. The perch-prevention point 20 is predeterminedly sharp and steep to prevent perching and consequential defecation of birds thereon.

[0042] Referring further to **FIGS. 1-14**, there are a plurality of standard diameters and materials of construction of ventilation pipes 2 on the market. These are subject to change and increase or decrease in plurality. Matching of inside and outside diameters of sleeves and threading as described within the specification and claims can be employed for size adaptations generally.

[0043] **Fig. 15** is a side elevation view of a ventilation pipe 2, extending through a roof 6 and encased by a ventilation pipe base 5, such as lead flashing, where the ventilation pipe 2 penetrates the roof 6. It can be seen that the ventilation pipe top opening 2a is open to the elements.

[0044] **FIG. 16** is a partially cutaway side elevation view of a ventilation-pipe plug 21 of an alternate embodiment of the present invention. The pipe plug 21 includes a head 22 having a outside periphery, or, for ventilation pipes 2 having a circular cross section, an outside diameter (o.d.), larger than an o.d. of the ventilation pipe 2. For example, the head 22 may have an o.d. of about 3.25 inches (82 millimeters). The head 22 includes a plurality of ventilation orifices 25

sized and arranged to prevent entry of debris and life forms into the ventilation pipe 2. For example, the orifices 25 may be circular in cross section and about 0.125 inches (3 millimeters) in diameter. It should be understood that the size and geometry of the holes may be sized, positioned, and configured in any number of ways by a skilled artisan to achieve a desired sewer gas flow out of the head and prevent ingress of undesirable life forms or objects. The head 22 transitions at its neck 24 down to a sleeve 23 having an outside periphery, or o.d., smaller than an inside periphery, or inside diameter (i.d.) of the ventilation pipe 2 to allow the sleeve 23 to be inserted within the ventilation pipe 2 as shown in FIG. 17. In an aspect of the invention, the sleeve 23 may be about six inches (150 millimeters) long, and have an o.d. of 1.25 inches (32 millimeters).

**[0045]** FIG. 17 is a partially cutaway side elevation view of the ventilation-pipe plug 21 installed in the ventilation pipe 2. To install the ventilation pipe plug 21, the sleeve 23 is inserted into the ventilation pipe 2. The neck 24 of the ventilation pipe plug 21 (transitioning to a relatively larger o.d. of the head 22 compared to the o.d. of the ventilation pipe 2) rests atop the ventilation pipe top opening 2a with the head 22 exposed. The larger o.d. of the head 22 prevents the ventilation-pipe plug 21 from entering the relatively smaller o.d. of the ventilation pipe 2. In this manner, ventilation-pipe plug 21 is gravity operable and remains securely in place. Advantageously, a fit of the neck 24 to the ventilation pipe 2 may have a relatively low tolerance for inexpensive manufacture and may be adhered with an adherent, such as a silicon-based caulk applied, for example, where the plug 21 rests on the ventilation pipe 2.

**[0046]** FIG. 18 is a plan view of a collar 26 extension for use with the ventilation pipe plug 21 of the present invention. To accommodate ventilation pipes 2 having a larger o.d. than an o.d. of the head 22, a washer, or collar 26, having an collar i.d. slightly larger than the o.d. of the sleeve, but smaller than the o.d. of the head, and a collar o.d. slightly larger than an o.d. of the ventilation pipe 2, may be provided. FIG. 19 is a partially cutaway side elevation view of a ventilation-pipe plug 21 of an alternate embodiment of the present invention installed in a ventilation pipe 2 with the collar 26 extension. Prior to installation into the ventilation pipe 2, the collar 26 may be position on the sleeve 23 and slid against the neck 24 before placing the sleeve 23 into the ventilation pipe 2. Once inserted into the ventilation pipe 2, the collar 26 rests on the top of the ventilation pipe 2 and prevents the head 22, having a larger o.d. than the collar

i.d., from entering the pipe 2. Advantageously, by employing the collar 26, one size of a ventilation-pipe plug 21 may be configured to accommodate different diameter ventilation pipes 2, even if the i.d. of the ventilation pipe 2 is larger than the head o.d.

[0047] It will become apparent to those skilled in the art that many changes, modifications, variations, and other uses and application of the subject cap/plug are possible and contemplated. All changes, modifications, variations, and other uses and applications which do not depart from the spirit and scope of the invention are deemed to be covered by the invention, which is limited only by the claims.